Intellectual Property in Cyberspace

- What, exactly, is Intellectual Property?

- How have intellectual property laws been challenged by the introduction of cybertechnology and digital information?
Why Property Laws are Important

- Property Laws play a key role in shaping a society and in preserving its order by establishing relationships between:
  - Individuals,
  - Different sorts of objects,
  - The state.
What Is (Tangible) Property?

- When discussing property, we tend to think of *tangible* items.

- Originally, "property" referred to land.

- Property now also includes objects that one can own, such as:
  - An automobile,
  - Articles of clothing,
  - DVD collection.
Property as a “Relational” Concept

- Property should not be viewed simply in terms of items or things (tangible or otherwise).

- Philosophers and legal theorists point out that property can best be understood as a *relationship between individuals in reference to things*, where three elements need to be considered:
  
  i. An individual (*X*),
  
  ii. A “thing” or object (*Y*),
  
  iii. *X*'s relation to other individuals (*A, B, C, etc.*) in reference to *Y*. 

Property as a Form of “Control”

- $X$ (as the owner of property $Y$) can control $Y$ relative to persons $A$, $B$, $C$, and so forth.

- If Harry owns a certain object (e.g. a laptop computer), then Harry can control who has access to that object and how it is used.
  - For example, Harry has the right to exclude Sally from using the laptop computer; or he could grant her unlimited access to that computer.

- Ownership claims involving "intellectual objects" are both similar to and different from ownership of tangible objects.
The expression *intellectual object* can refer to various forms or instances of intellectual property.

Intellectual property consists of “objects” that are not tangible.

Intellectual objects represent creative works and inventions, i.e., expressions of ideas.
Intellectual vs. Tangible Objects

- Tangible objects are *exclusionary* in nature.
  - If Harry owns a laptop computer (a physical object), then Sally cannot, and *vice versa*.

- Intellectual objects, such as software programs, are *non-exclusionary*.
  - If Sally makes a copy of a word-processing program (that resides in Harry's computer), then both Sally and Harry can possess copies of the same word-processing program.
The sense of *scarcity* that applies to tangible objects, which often causes competition and rivalry, need not exist for intellectual objects.

- For example, there are practical limitations to the number of physical objects that one can own.
- There are also limitations (natural and political) to the amount of land that can be owned.

Intellectual objects can be easily reproduced.

- Countless copies of a software program can be produced – each at a relatively low cost.
Ownership of Intellectual vs. Tangible Objects

- Legally, one cannot own an idea in the same sense that one can own a physical object.

- Governments do not grant ownership rights to individuals for ideas per se.

- Legal protection is given only to the tangible *expression* of an idea that is creative or original.
Ideas vs. Expressions of Ideas

- If an idea is literary or artistic in nature, it must be expressed (or "fixed") in some tangible medium in order to be protected.

- A “tangible medium” could be a physical book or a sheet of paper containing a musical score.

- If the idea is functional in nature, such as an invention, it must be expressed in terms of a machine or a process.

- Authors are granted copyright protections for expressions of their literary ideas, while inventors are given patent protection for their inventions.
Why Protect Intellectual Property?

- One answer is: Our current laws say that intellectual property should be protected.

- But we can ask: On what philosophical grounds are our property laws themselves based?

- In Anglo-American law, philosophical justification for intellectual property rights is grounded in two different types of views:
  - natural rights,
  - conventional (or constructed) rights.
One theory holds that a property right is a "natural right," to which individuals are justified for the products that result from their labor, including intellectual objects.

The other theory views property rights as a social construct designed to encourage creators and inventors to bring forth their artistic works and inventions into the marketplace.
Software as Intellectual Property

- Should computer programs be eligible for patent protection?
- Should they be protected by copyright law?
- Do they deserve both, or perhaps neither, kind of protection?
- Computer software consist of lines of programming code (or codified thought).
- It is not expressed or "fixed" in a tangible medium in a way that literary works are.
Software as Intellectual Property (Continued)

- A program's *source code* consists of symbols.

- Its *object code* is made up of "executable images" that run on the computer's hardware after they have been converted from the original source code.

- Some argued that computer programs are more like inventions that can be patented.
Software programs also resemble algorithms, which, like mathematical ideas or "mental steps," are not eligible for patent protection.

Initially, computer programs were not eligible for either copyright or patent protection.

Eventually, however, both copyright and patent protections were granted to software programs.
The Case for Protecting Software as a form of Intellectual Property

The software industry has made the following kind of argument for why software should be protected with intellectual property rights.

PREMISE 1. Stealing a tangible object is morally wrong.
PREMISE 2. Making an unauthorized copy of proprietary software is identical to stealing a tangible object.

CONCLUSION. Making unauthorized copies of proprietary software is morally wrong.
If we apply the rules for logical validity, we see that this argument is *valid* because of its logical form.

Consider that *if* both Premises 1 and 2 are assumed true, the conclusion cannot be false.

Even though the argument’s form is valid, we could still show the argument to be *unsound* if either or both of the premises are false.
Protecting Software Continued)

- Premise 1 (in the above argument) is fairly straightforward, and few would question its truth.

- But Premise 2 is more controversial and thus we can question whether it is empirically true.
  - For example, is duplicating a software program identical to stealing a physical item?

- Consider that software programs, like other intellectual objects, are nonexclusionary; so my having a copy of Program X does not exclude your having a copy of that program, and vice versa.

- Because the truth of Premise 2 is questionable, we cannot infer that the above argument is sound.
Protecting Software (Continued)

- But even if the original argument turns out to be unsound, it does not follow that its conclusion – “Making unauthorized copies of proprietary software is morally wrong” – is false.
  - For example, the argument’s conclusion could be true for reasons other than those stated in the premises.

- Consider that even if duplicating software is not identical to stealing physical property, it could still cause harm to the property owner because copying the proprietary software program (like the theft of someone’s physical property) deprives the property owner of the legitimate use of his or her property.
We examines four schemes for protecting intellectual property:

1) *Copyrights*;
2) *Patents*;
3) *Trademarks*;
4) *Trade secrets*. 
Copyright Protection

- The English Statute of Anne (1710) was the first law to give protection to authors for works attributed to them.

- The American Colonies followed English law regarding copyright.

- In the US Constitution, a specific provision in Article 1, Section 8 states:

  *The congress shall have the power... to promote the Progress of Science and the useful Arts, by securing for limited Times to authors and inventors the exclusive Rights to their respective Writings and Discoveries.*
Evolution of U.S. Copyright Law

- The first copyright law was enacted in 1790.

- It applied primarily to books, maps, and charts.

- The law was later extended to include newer forms of media such as photography, movies, audio recordings, and so forth.

- In 1909, the copyright law was amended to include any "form that could be seen and read visually" by humans.

- This change was in response to a new technology: the player piano.
Evolution of Copyright Law in the U.S. (Continued)

- The 1909 change was prompted by a case in 1908 involving a song that was copied onto a perforated piano music roll.

- Since the musical copy could not be read visually (by humans) from the piano roll, the copy was not considered a violation of the song's copyright.

- The "machine readable" vs. "human readable" distinction had implications for decisions about whether software programs could qualify for copyright protection.
Evolution of Copyright Law in the U.S. (Continued)

- A software program’s source code can be read by humans.

- Its "executable code," which "runs" on a computer, cannot be read by humans.

- Beginning in the 1960s, arguments were made that computer programs should be eligible for copyright protection.
Evolution of Copyright Law in the U.S. (Continued)

- Under the 1976 Copyright Act, computer programs still did not clearly satisfy the requirements necessary for making them eligible for copyright protection.

- Copyright law was significantly modified again in 1976.

- The Copyright Act was amended again in 1980 to address the status of software programs.
In 1976, the concept of a literary work was extended to include:

- programs,
- computers,
- databases that "exhibit authorship."
Copyright Law and Software in the U.S.

- A computer program was defined under the US Copyright Act as a set of statements or instructions to be used directly in a computer in order to bring about certain results.

- To get a copyright for a computer program, the author had to show that the program contained an *original expression of ideas* and not simply the ideas themselves.
In 1998, two important amendments were made to the 1976 Copyright Act:
- Sonny Bono Copyright Term Extension Act (SBCTEA),
- Digital Millennium Copyright Act (DMCA).

The SBCTEA extended the length of copyright protection from the life of the author plus 50 years to the life of the author plus 70 years.
What Does Copyright Law Protect?

- A copyright is a legal form of protection given to a "person" or author.

- The author can be an entity such as organization or a corporation, such as Microsoft, as well as an individual.

- A copyright protection is given for the expression of an idea such as a book, poem, musical composition, photograph, dance movement, motion pictures, audiovisual works, or computer software.
Copyright Protection: Three Conditions

For a work to be protected under copyright law, it must satisfy three conditions in that it needs to be:

1) Original
2) Non-functional
3) Fixed in a tangible medium.
Copyright Protection (Continued)

Copyright holders have the exclusive right to:

- make copies of the work;
- produce derivative works, translations into other languages, movies based on the book, and so forth;
- distribute copies;
- perform works in public (musicals, plays, etc.);
- display works in public (e.g., art works).
The Fair Use Provision in Copyright Law

- The principle of *fair use* balances the exclusive controls given to copyright holders against the broader interests of society.

- Fair use means that an author or publisher may make limited use of another person's copyrighted work for purposes such as:
  - Criticism,
  - Comment,
  - Teaching,
  - Scholarship,
  - Research.
The fair-use principle has also supported the practice of "reverse engineering."

Reverse engineering is very important in the computer industry in particular, and in engineering in general, because it allows someone to buy a product for the purpose of taking it apart to see how it works.
The First-Sale Doctrine in Copyright Law

- The first-sale doctrine is another balancing scheme in copyright law.

- It applies once the original work has been sold for the first time.

- Once you purchase a copy of a book, audio tape, painting, etc., you are free to give away, resell, or even destroy the copy of that work.

- It is not clear whether one is permitted to give away digital versions of these works.
Patent Protections

- A patent is a form of legal protection given to individuals who create an invention or process.

- Unlike copyrights, patents offer a 20-year exclusive monopoly over an expression or implementation of a protected work.

Patents: Three Conditions

- Patent protection can be applied to inventions and discoveries that include utilitarian or functional devices such as machines, “articles of manufacture,” or "compositions of matter."

- Patents are granted to inventions and discoveries that satisfy three conditions:
  1) *usefulness*,
  2) *novelty*,
  3) *non-obviousness*. 
Proliferation of Patents for Computer Software

- Some worry that patent protection has gone too far.

- The U.S. Patent and Trademark Office (PTO) issues about 20,000 new software patents every year.

- Aharonian (2001) notes that between 1993 and 1999, the number of patents issued increased by tenfold.

- Between 1979 and 1999, more than 700,000 patents had been issued for electronics inventions.
Trademarks

- A *trademark* is a word, name phrase, or symbol that identifies a product or service.

- The Lanham Act, also referred to as the Trademark Act of 1946, was passed to provide protection for registered trademarks.

- The Act intends to ensure that the quality associated with a certain logo or symbol used by a business actually represents the quality that consumers expect (e.g., the BMW label).
Trademarks (Continued)

- To qualify for a trademark, the "mark" or name is supposed to be *distinctive*.

- However, Deborah Halbert (1999) notes that a (not so distinctive) trademark for "uh-huh" was granted to Pepsi.

- Also, consider that a major movie theatre in the U.S. has trademarked the expression “Silence is Golden.”
Trade Secrets

- A trade secret is defined as information used in the operation of a business or other enterprise that is sufficiently valuable and secret to afford an actual or potential economic advantage over others.

- Trade secrets can be used to protect:
  - formulas (such as the one used by Coca-Cola);
  - blueprints for future projects;
  - chemical compounds;
  - process of manufacturing.
In the late 1970s and early 1980s, the burgeoning computer industry hired many of the best software developers and programmers from academic computing labs.

Some of those individuals took the software they developed with them, and some of that software eventually became proprietary.

In response, Stallman began his GNU (Gnu’s Not Unix) project in 1984, whose goal was to develop an entire Unix-like operating system that was “open” and freely accessible.
GNU and the Free Software Foundation (FSF)

- FSF was formed in 1985 to support of Stallman’s GNU project.

- According to FSF, four “freedoms” are essential for free software, i.e., the freedom to:
  1. Run the program, for any purpose;
  2. Study how the program works, and adapt it for your needs;
  3. Redistribute copies so you can help your neighbor;
  4. Improve the program, and release your improvements to the public so that the whole community benefits.
The Open Source Initiative (OSI)

- OSI shares many of the same goals as FSF, including the ability of a software user to look at, understand, modify and redistribute the source code for that software.

- Like FSF, OSI requires that the source code for “open source software” (OSS) is freely available.

- So, both the OSS and FSF movements are similar with respect to their requirements for source code in the software development process.

- There are also important differences between OSS and FSF.
Raymond (2004) notes that OSS and FSF have different philosophies or “attitudes” because:

- FSF continues to focus on promoting its philosophical position that software should be free.
- OSS has concentrated its efforts more on promoting the open source model as an alternative methodology to “closed-source” development for software.

OSS and FSF also differ with respect to requirements for how the software is used “downstream.”
OSS and FSF (Continued)

- FSF requires that all derivative pieces of software be subject to the original requirements and thus remain “open” and nonproprietary.

- OSS is more flexible with respect to its derivative software.

- FSF requires that users strictly adhere to its GPL (General Programming License) in all derivative uses of its software.

- OSS supports less restrictive licenses that permit programmers to alter the open source software and to release it as a proprietary product.